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Date: 27.09.2004

Amendment of the claims under Article 19(1)(Rule 46)

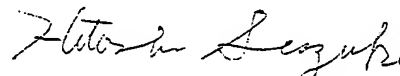
Re: International Application No. PCT/JP2004/009413
International Filing Date: 02.07.2004
Applicant: Toyo Communication Equipment Co., Ltd. et al
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Agent's File reference: ST04-09

Dear Sirs,

The applicant, who received the International Search Report relating to the above identified International Application transmitted on 02.07.2004, hereby files amendment under Article 19(1) as in the attached sheets.

The applicant hereby replaces the sheets Nos. 18 - 20/1. As a result of the replacement, all of claims (old claims 1 - 17) are amended, and the claim 13 is new.

Very truly yours,



HITOSHI SUZUKI

Attachment:

(1) Amendment under Article 19(1)

1 Sheet

CLAIMS

- [1] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a
5 detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is made from a quartz material having a cut angle that allows measurement of a natural frequency based on a
10 thickness of said thin portion when a current is caused to flow in said thin portion.
- [2] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed
15 in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is made from a quartz material having a thickness sliding oscillation mode or a thickness vertical mode that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion.
- [3] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed
20 in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is constituted of an AT cut
25

quartz plate that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion.

[4] (Amended) A quartz pressure sensor of a touch-mode type, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is made from a quartz material having a cut angle that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion.

[5] (Amended) A quartz pressure sensor of a touch-mode type, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is made from a quartz material having a thickness sliding oscillation mode or a thickness vertical mode that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion.

[6] (Amended) A quartz pressure sensor of a touch-mode type, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is made of an

AT cut quartz plate that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion.

[7] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a
5 detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is of a touch-mode type made from a quartz material having a cut angle that allows measurement of a natural
10 frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion, and the thin portion of said detecting piece or the upper electrode film is in a contacting state with said dielectric film or the face of said bottom plate during non-measurement.

[8] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode
15 film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is of a touch-mode type
20 made from a quartz material having a thickness sliding oscillation mode or a thickness vertical mode that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion, and the thin portion of said detecting piece or the upper electrode film is in a contacting state with said dielectric film or the face of said bottom plate during non-measurement.

[9] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is of a touch-mode type constituted of an AT cut quartz plate that allows measurement of a natural frequency based on a thickness of said thin portion when a current is caused to flow in said thin portion, and the thin portion of said detecting piece or the upper electrode film is in a contacting state with said dielectric film or the face of said bottom plate during non-measurement.

[10] (Amended) A quartz pressure sensor of a touch-mode type, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece is constituted of a quartz plate having a cut angle where a normal line to a face of the quartz plate is approximately coincident with a direction of a crystal axis of quartz.

[11] (Amended) A quartz pressure sensor, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that said detecting piece, as a quartz plate, is of a touch-mode type that is constituted of a quartz plate having a cut angle where a normal line to

a face of the quartz plate is approximately coincident with a direction of a crystal axis of quartz, and the thin portion of said detecting piece or the upper electrode film is in a contacting state with said dielectric film or the face of said bottom plate during non-measurement.

5 [12] (Amended) The quartz pressure sensor according to claims 1 to 11, characterized in that said detecting piece comprises said thin portion and a thick portion surrounding said thin portion, and at least said thick portion is fixed on a face of said bottom face.

[13] (Added) The quartz pressure sensor according to claims 1 to 11, characterized in that said detecting piece comprises said thin portion and a thick portion surrounding said thin
10 portion, said bottom plate is made from a quartz material, has a recessed portion obtained by forming one portion of the quartz material in a thin portion, and has said lower electrode film and said dielectric film sequentially laminated on a bottom face of said recessed portion, and thick portion of said detecting piece is fixed on an upper face of a thick portion of said bottom plate such that the thin portion of said detecting piece is positioned on an upper face of the
15 recessed portion of said bottom plate.

[14] (Amended) The quartz pressure sensor according to claims 1 to 11, characterized in that said detecting piece and said bottom plate are made from quartz materials of the same kind, and said detecting piece is fixed on said bottom plate such that crystal axes of said detecting piece and said bottom plate coincide with each other.

20 [15] (Amended) The quartz pressure sensor according to claims 1 to 10, characterized in that said thin portion is one obtained by forming a quartz plate to be thin by an etching process.

[16] (Amended) The quartz pressure sensor according to claims 1 to 11, characterized in that said detecting piece comprises said thin portion and a thick portion surrounding said thin

portion, and said thin portion is obtained by forming a quartz plate to be thin by an etching process.

[17] (Amended) The quartz pressure sensor according to claims 1 to 11, comprising a bottom plate, a lower electrode film and a dielectric film sequentially laminated on an upper face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the upper face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, characterized in that a vacuum space is provided between said upper electrode film and said dielectric film.

10 [18] (Amended) A manufacturing method of the quartz pressure sensor according to claims 1 to 9, characterized in that a step of processing a thickness of a quartz plate to form said thin portion includes a step of frequency-converting the thickness of said thin portion to confirm the same.